



Lab-grown diamond

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Why is in news? Lab-grown diamonds get R&D grant, duty cut boost

During her Budget speech, Finance Minister Nirmala Sitharaman announced the government's move to focus on lab-grown diamonds. "Customs duty on the seeds used in lab-grown diamond manufacturing will be reduced", announced the finance minister. She also announced a grant to IITs to facilitate the growth of LGDs in India.

Lab-grown diamonds are diamonds that are **produced using specific technology which mimics the geological processes that grow natural diamonds**.

They are **not the same as "diamond simulants"** – LGDs are **chemically, physically and optically diamond** and thus **are difficult to identify** as "lab-grown."

While materials such as Moissanite, Cubic Zirconia (CZ), White Sapphire, YAG, etc. are "diamond simulants" that simply attempt to "look" like a diamond, they lack the sparkle and durability of a diamond and are thus easily identifiable. However, differentiating between an LGD and an Earth Mined Diamond is hard, with advanced equipment required for the purpose.

How are LGDs produced?

There are multiple ways in which LGDs can be produced. The **most common (and cheapest) is the "High pressure, high temperature" (HPHT) method**. As the name suggests, this method requires extremely heavy presses that can produce up to 730,000 psi of pressure under extremely high temperatures (at least 1500 celsius). Usually **graphite is used as the "diamond seed"** and when subjected to these extreme conditions, the relatively inexpensive form of carbon turns into one of the most expensive carbon forms.

Other processes include **"Chemical Vapor Deposition" (CVD)** and **explosive formation** that creates what are known as **"detonation nanodiamonds"**.

What are LGDs used for?

LGDs have basic properties similar to natural diamonds, including their optical dispersion, which provide them the signature diamond sheen. However, since they are created in controlled environments, many of their properties can be enhanced for various purposes.

For instance, LGDs are most often used for industrial purposes, in machines and tools. Their **hardness and extra strength make them ideal for use as cutters**. Furthermore, **pure synthetic diamonds have high thermal conductivity, but negligible electrical conductivity**. This combination is invaluable for electronics where such diamonds can be used as a heat spreader for high-power laser diodes, laser arrays and high-power transistors.

Lastly, as the **Earth's reserves of natural diamonds are depleted**, LGDs are slowly replacing the prized gemstone in the jewelry industry. Crucially, like natural diamonds, LGDs undergo similar processes of polishing and cutting that are required to provide diamonds their characteristic lustre.

Thus, growth in the production of LGDs is unlikely to affect India's established diamond industry which undertakes these tasks.